

CHAPTER 2: NUTRITION

1. Living things need food to survive.
2. Food can be divided into seven classes as follows:
 - i. carbohydrates
 - ii. proteins
 - iii. fats
 - iv. vitamins
 - v. minerals
 - vi. fibre
 - vii. water

Carbohydrate PMR 03 FOOD TEST

1. Carbohydrate is made up of carbon, hydrogen and oxygen.
2. There are three types of carbohydrate, starch, sugar and cellulose.
3. Carbohydrates are present in various forms, such as:
 - i. starch, which is stored in plants.(bread, potatoes)
 - ii. Sugars, which are sweet and soluble in water.
 - iii. Cellulose, which is found in plant cell walls and cannot be digested.(vegetable and fruits)
 - iv. Glycogen, which is found in liver and muscles.
4. Food rich in carbohydrate include rice; potato, sugar, bread, and banana.
5. Carbohydrate is our main source of energy. Carbohydrate supplies us with energy to carry out daily activities such as walking, breathing, and working.

Protein PMR 03 FOOD TEST

1. Protein is made up of carbon, hydrogen, oxygen, and nitrogen.
2. Sometimes protein can also contain phosphorus and sulphur.
3. Food rich in protein includes fish, milk, meat, egg white and nuts (groundnuts and soya bean). PMR 04
4. Proteins are required for building new cells for growth, to replace damaged tissue.

5. Growing children require a lot of protein. Lack of protein will cause a disease known as kwashiorkor (stunted growth).

Fat

1. Fat is made up of carbon, hydrogen and oxygen but the ratio is different from that of carbohydrate.
2. Food rich in fats includes palm oil, butter and egg yolk.
3. Fat produces twice the amount of energy compared with carbohydrate of the same weight.
4. The functions of fat include:
 - a. supplying energy,
 - b. as an insulator of heat to reduce heat loss from the body,
 - c. protecting the internal organs such as the kidneys and the heart,
 - d. dissolving some vitamins in the body like vitamin A, D, E and K.

Vitamins

Go to www.exhibits.pacsi.org/nutrition play 'nutrition sleuth' and click 'open the case book' to check what you know about nutrients.

1. Vitamins are required in small quantities only.
2. Vitamins are classified into two groups
 - a. vitamins soluble in water - vitamin B and C ,
 - b. vitamins soluble in fat- vitamin A, D, E and K.
3. Vitamins protect the body from various types of diseases and maintain the health of the body.

Vitamin	Main source	Function	Effect of deficiency
A	Egg, milk, cod liver, oil, carrot, papaya	<ul style="list-style-type: none"> - for growth and to promote healthy skin - for good vision 	<ul style="list-style-type: none"> - night blindness - dry and scaly skin
B	yeast, egg, milk, tomato, liver, nuts	<ul style="list-style-type: none"> - promotes the effective functioning of the nervous system - control the supply of carbohydrates to the muscle and nerve cells 	<ul style="list-style-type: none"> - beri-beri (injury to the nervous system and paralysis) - pellagra - anaemia
C	lime, citrus fruits, tomato, carrot, papaya, green vegetables	<ul style="list-style-type: none"> - increase immunity against disease - promotes healthy skin 	<ul style="list-style-type: none"> - scurvy (gusi merah) - anaemia - low resistance to infections (especially the flu)
D	egg, milk, cod liver oil	<ul style="list-style-type: none"> - helps in the absorption of calcium and phosphorus in the small intestines for the growth of strong bones and teeth. 	<ul style="list-style-type: none"> - rickets (weak and curved bones) - tooth decay
E	vegetable oil, palm oil, egg, liver, milk	<ul style="list-style-type: none"> - maintains a healthy reproductive system 	<ul style="list-style-type: none"> - sterility - infertility
K	maize, sunflower seeds, tomato, green vegetables	<ul style="list-style-type: none"> - necessary for the clotting of blood. 	<ul style="list-style-type: none"> - blood slow to clot

Minerals

1. minerals are simple chemicals usually found in the body.
2. our bodies need more calcium and phosphorus than the minerals.(because they help to form strong bones and teeth)
3. minerals are needed for good health.

Sources and functions of minerals as well as the effects of mineral deficiencies

Minerals	sources of food	Functions	effects of deficiency
Calcium	milk, eggs, vegetables, cheese	* forms strong bones and teeth * helps blood to clot	* rickets * brittle bones and teeth * poor blood clotting
iron	liver,, meat, eggs, vegetables	* forms haemoglobin in red the thyroid blood cells	* anaemia
iodine	seafood, vegetables, iodinised salt	* produces hormones in the thyroid gland	* Goitre
sodium	common salt,	* balances body fluid	* muscle cramps
phosphorus	meat, milk, eggs, beans	* forms strong bones and teeth	* rickets * dental decay
fluorine	drinking water, fish, vegetables	* protect teeth	* Dental decay
potassium	meat, fish, cereals	* maintains a healthy nervous system	* muscle cramps

Fibre

1. Fibre is made up of cellulose which cannot be digested by the body.
2. A shortage of fibre in our daily diet can cause constipation and sometimes even bowel cancer.
3. Vegetables, fruit, beans, lentils and brown bread are examples of food rich in fibre.

Water

1. approximately 65% to 70% of a person's body weight is made up of water.
2. The body obtains water when we drink water and also when we consume fruits and vegetables.

3. Water is needed by the body for:
 - a. helping in the digestion of food
 - b. transporting digested food substances
 - c. transporting excretory products such as urea.
 - d. maintaining the concentration of blood.
 - e. maintaining the body temperature
 - f. all metabolic processes

<u>FOOD TEST</u> (experiment) PMR 03

The importance of a balanced diet

http://www.en.wikipedia.org/wiki/food_guide_pyramid

1. Diet refers to the food and drinks that we consume daily.
2. A balanced diet is one which contains carbohydrates, proteins, fats, minerals, vitamins, water and fibre in the correct quantities and proportions.
3. A balanced diet is necessary for:
 - a. supplying the required energy
 - b. balanced body growth
 - c. maintaining the health of the body
 - d. preventing deficiency diseases such as scurvy and rickets.
4. A balanced diet varies according to one's
 - i. Age
 - ii. size
 - iii. sex
 - iv. job
 - v. climate
 - vi. state of health

Factors that influence a person's needs for a balanced diet

Factors	the group requiring more energy	Reason
sex	men required more energy compared to women of the same age and body size.	men are more active
age	babies, children and teenagers require more energy compared to adults or the elderly. Example: the heartbeat of baby is 100 beats a minute compared to an adult who has 75 beats per minute.	this group is more active and the life processes are faster.
body size	big-size individuals require more energy size compared to small-sized individuals.	big-sized individuals require more energy for their life processes.
physical activity	an individual who does heavy work uses more energy compared to another who does light work.	heavy work requires more energy to perform.
weather	individuals living in places with cold weather require more energy compared to individuals living in places with warm weather.	more energy is required to maintain the body temperature in a cold place.

The calorific value of food PMR 06, 07

1.. Energy in food measured in joules (J) or calories (cal).

1 calorie (cal) = 4.2 joules (J)

1 kilocalorie (kcal) = 4.2 kilojoules (kJ)

2. The calorific value of food is the amount of heat energy released when one gram of food is completely burnt in the air.
3. The calorific value of food is measured in kilojoules per gram (kJ/g) or kilocalories per gram (kcal/g)
4. The calorific value differs for different types of food. Table below shows the calorific value of some of the food that we eat daily.

food type	calorific value (kJ/g)
margarine	35.5
Cake	18.3
Rice	15.0
<i>roti canai</i>	13.3

fried noodles	13.0
chicken curry	7.8
Egg	6.8
banana	3.3
papaya	1.65
spinach	0.88

5. Table shows the results of surveys carried out on individuals according to age, sex and profession.

Individual	energy in kJ	
	male	Female
child, 8 years old	8800	8800
teenager, 15 years old	12600	9600
adult, clerk	11500	9450
adult, labourer	20000	12600
pregnant mother	-	10000
lactating mother	-	11300

HUMAN DIGESTIVE SYSTEM

<http://www.teachnet.ie/farmnet/Digestive.htm>

<http://www.enchantedlearning.com/subjects/anatomy/digestive/>

1. Digestion is the process of breaking down large and complex food substances into smaller, simpler molecules. These molecules are soluble and can be absorbed by body cells.
2. the digestive process occurs in a system which is called the digestive system.
3. Figure below shows the human digestive system

m/s 49 figure 2.8 (Photostat)

4. part of the digestive system and their function are shown below.

parts of the digestive tract	Functions
Mouth	<ul style="list-style-type: none"> • chew and grinds food using the teeth • digests cooked starch. The amylase enzymes in the saliva change cooked starch to maltose. • The salivary glands secrete saliva which contains an enzyme called <i>amylase</i>. • Amylase digests starch and convert it to <i>maltose</i> (a type of sugar)
Oesophagus	<ul style="list-style-type: none"> • <u><i>bolus-shaped</i></u> food is moved from the mouth to the stomach along the oesophagus by wave-like muscular contractions called <u><i>peristalsis</i></u>.
Stomach PMR 03	<ul style="list-style-type: none"> • holds food, secretes <i>gastric juices</i> which begin the digestion of protein • secretes acids contains hydrochloric acid which kill the bacteria in food.
Duodenum	<ul style="list-style-type: none"> • receives <i>bile</i> from the liver and <i>pancreatic juice</i> from the pancreas. • Digestion and absorption of food.
small intestine	<ul style="list-style-type: none"> • secretes <i>intestinal juice</i> which completes the digestion of protein, carbohydrates and fat. • Absorbs end products of digestion into the blood.
large intestine	<ul style="list-style-type: none"> • absorption of most of the remaining water and minerals.
Rectum	<ul style="list-style-type: none"> • stores <i>faeces</i>
Anus	<ul style="list-style-type: none"> • removes <i>faeces</i> through defecation.

6. The process of digestion in the alimentary canal:

- a. **physical digestion** - involves the mechanical process of breaking down large pieces of food into smaller particles using the teeth and the churning movements of the alimentary canal.
- b. **chemical digestion** - involves the action of various

enzymes in breaking down complex food molecules. These complex molecules are insoluble but the end products of chemicals digestion are simpler molecules which are soluble.

7. Flow of food particles in the alimentary canal:

Go to www.kidshealth.org/kid/body/mybody_SW.html click on 'digestive system' for a tour through your food tube.

For easy access, go to www.icd.com.my

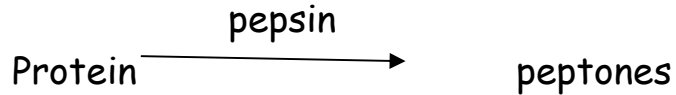
a. mouth

- i. Digestion begins in the mouth.
- ii. The teeth chew and grind food into smaller particles.
- iii. the salivary glands secrete saliva which contains an enzyme called amylase.
- iv. Amylase digests starch and converts it to maltose, a type of sugar.
- v. The wave-like contractions of the oesophagus muscles are known as peristalsis.

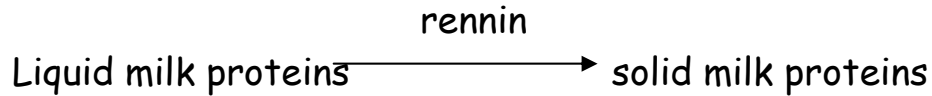
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b. stomach

- i. in the stomach, food is mixed with gastric juices. Gastric glands in the stomach wall.
- ii. Gastric juices contains hydrochloric acid and enzymes (rennin and pepsin) .
- iii. The functions of hydrochloric acid include:
 - a. Hydrochloric acid stops the action of the enzymes in saliva.
 - b. It also kills bacteria in food.
- iv. Enzymes in the gastric juices start the digestion of protein.
Example:
 - a. pepsin digests protein into peptones.



b. Rennin coagulates milk in the stomach to help in the enzymic action of pepsin.



v. Partially digested food is then released into the duodenum.

c. small intestine

- i. The duodenum is the first parts of the small intestine.
- ii. The duodenum receives bile and pancreatic juice. (bile is stored in the gall bladder)
- iii. The function of bile:
 - a. Emulsifications of fat i.e. breaking up large fatty globules into small droplets for enzymic action.
 - b. Preparation of an alkaline medium for enzymic action.
- iv. The pancreatic amylase digests starch into maltose.
- v. The protease digests protein/peptones into amino acids.
- vi. The lipase digests fat into fatty acid and glycerol.
- vii. The small intestine (ileum) produces enzymes which digest maltose into glucose (simple sugar)
- viii. Digestion is completed in the small intestine.
- ix. The digested food is then ready to be absorbed through the thin walls of the small intestine into the bloodstream.

SUMMARY OF PROCESS OF CHEMICAL DIGESTION IN THE HUMAN ALIMENTARY CANAL

Absorption of the products of digestion

1. Absorption is the process when the end products of digestion enters the bloodstream through the small intestinal walls.

2. The inner surface of the small intestine (6 metres long) covered with millions of small projections about 1mm long. These projections are called villi @ villus.
3. Food that has been digested into its most simple form is absorbed by the villi @ villus on the small intestinal walls into the bloodstream.
4. The efficiency of absorption of digested food at the small intestine can be increased by:
 - a. more villus to increase surface area
 - b. villus with very thin walls
5. Each villus has a network of a blood capillaries and a lacteal.
6. Glucose, amino acids, minerals and water-soluble vitamins are absorbed into the blood capillaries.
7. Fatty acids, glycerol and fat-soluble vitamins (vitamin A, D, E and K) are absorbed into the lacteal.

lukis rajah m/s 52 figure 2.13

REABSORPTION OF WATER AND DEFACATION

Go to www.innerbody.com/htm/body.html move over the image of digestive system' and then click on the eyeglasses at the ascending colon.

Reabsorption of water

1. The main function of big intestine is to reabsorb water.
2. The substances that enter the big intestine consist of water and undigested food substances like cellulose from the fibre of vegetables and fruits (roughage)
3. Water is reabsorbed from these undigested food substances.
4. Undigested food materials together with water is passed to the colon (first part of the large intestine) rectum is the last portion of the large intestine

http://www.abbysenior.com/biology/digestive_system.htm

Defecation

1. Undigested food in the big intestine is expelled as faeces through the process of defecation.
2. When the rectum is full of faeces, the rectum undergoes peristalsis and assisted by abdominal contraction, will push the faeces through the anus to be expelled.
3. If an individual has problems passing motion, he or she is said to be constipated.
4. Constipation takes place because of the lack of water in the diet.

Lukis rajah m/s 53 figure 2.15

[Lihat Microsoft power point](#)

HEALTHY EATING HABITS

The food pyramid **PMR 05, 08**

http://www.east-buc.k12.ia.us/04_05/655/bs/bs.htm

http://www.pediatric-orthopedics.com/Topics/Bow_Legs/bow_Legs.html

1. Healthy eating habits will help maintain a healthy body.
2. Unhealthy eating habits cause various health problems.

1. excessive nutrient	health problems
Sugar	tooth decay, obesity, diabetes
Salt	high blood pressure, heart problems, kidney damage
fat/oil	heart problems, high blood pressure
2. lack of nutrient	health problems
Protein	kwashiorkor in children
Roughage	Constipation
Vitamins	lower immunity to diseases

<http://www.fl DOE.org/nutrition/general/pyramid.asp>

http://kidshealth.org/kid/stay_healthy/food/pyramid.html

http://www.healthgoods.com/education/Nutrition_information/Nutrition_short_course/food_guide_pyramid.htm

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